

Feb. 28, 1967

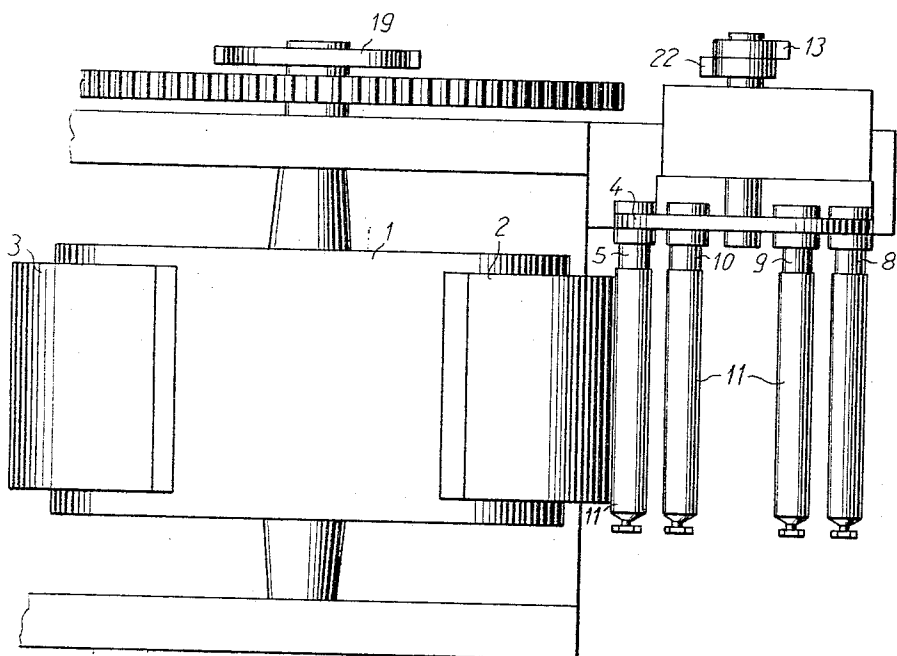
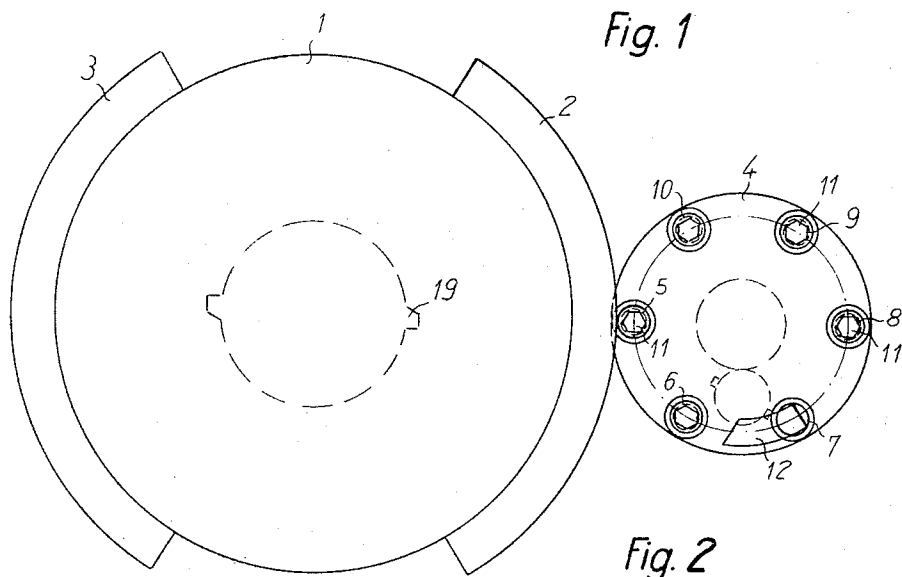
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3,306,190

CONTROL DEVICE FOR ROTARY PRINTING APPARATUS

Filed Jan. 9, 1965

2 Sheets-Sheet 1



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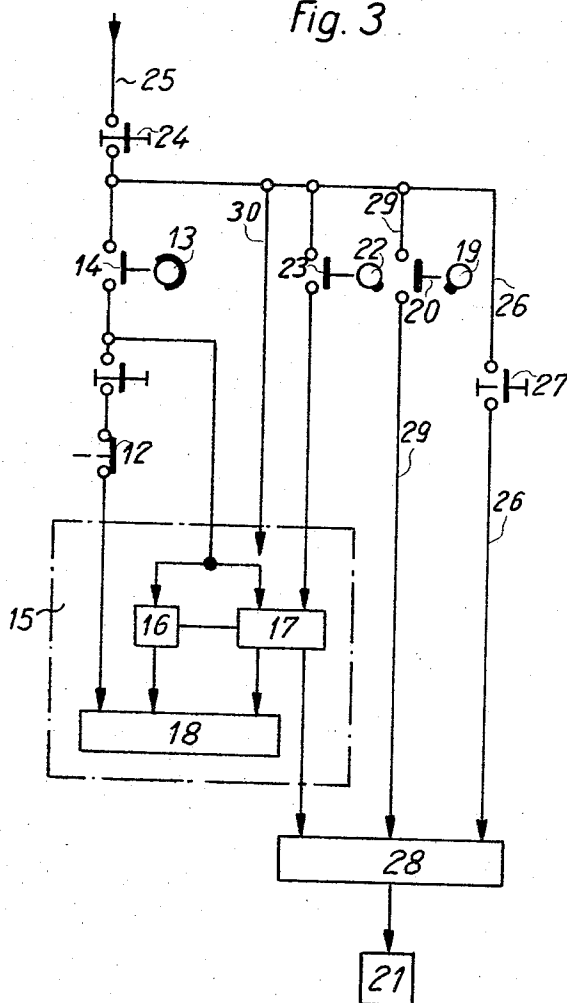
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Filed Jan. 9, 1965

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Fig. 3



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3,306,190

CONTROL DEVICE FOR ROTARY PRINTING APPARATUS

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Filed June 9, 1965, Ser. No. 462,656

Claims priority, application Switzerland, June 15, 1964, 7,739/64

4 Claims. (Cl. 101—37)

This invention relates to the control of cyclically operable apparatus and, more particularly, to a novel device for interrupting the operating cycle of the apparatus responsive to the absence of a workpiece to be processed.

Among representative apparatus to which the present invention is applicable are printing and lacquering machines for printing and/or lacquering hollow bodies, such as tubes, as well as tape printing machines and the like. In such apparatus it is known to provide devices for sensing the absence of a hollow body or workpieces and, responsive to such sensing of the absence of a hollow body or workpiece, to disconnect the printing or lacquering mechanism, push it aside, and pivot the printing segments out of the printing line. Alternatively, the cyclically operable turret head, carrying the workpieces to be printed on rotatable mandrels, is moved out of the printing line.

To provide the signal for initiating such control action, the means used hitherto has been an electrical checking contact operated either at the printing unit or at one stopping point immediately before the printing unit, this switch being operated either directly or by a mechanical-electrical checking or sensing mechanism. In the event that it is not possible to provide a checking device either at the printing unit or at a stopping point immediately in advance of the printing unit, it has been necessary to use relatively expensive electronic controls, or relatively extensive electrical controls. Alternatively, it has been necessary to store the signal by mechanical means, and such not only involves major expenditures but also requires a considerable amount of space.

An object of the present invention is to provide a signal storing and function triggering device for cyclically operable mechanism, and which device is free of the above-mentioned disadvantages.

Another object of the invention is to provide such a device which may be arranged selectively at any one of several stopping points in advance of a work unit, such as a printing unit.

A further object of the invention is to provide such a signal storing and function triggering device which, upon the absence of workpieces on work holding devices, transmits pulses from a checking device to a control device through a contact means actuated by a driving eccentric.

Still another object of the invention is to provide a signal storing and function signaling device for cyclically operable mechanism operable, upon absence of workpieces on work holding devices, to transmit pulses to a control device where the signals are stored and later passed on to a mechanism controlling contact actuated by a driving eccentric.

Still a further object of the invention is to provide a signal storage and function triggering device for cyclically operable mechanisms operable, upon sensing of the absence of workpieces from work holding devices, to transmit pulses to a checking device for storage, with the stored signals being delivered to a mechanism controlling contact actuated by a driving eccentric to effect deactivation of the cyclically operable mechanism, and responsive, after correction of the sensed condition, to re-activate the cyclically operable mechanism.

Still another object of the invention is to provide a de-

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vice of the type just mentioned, in which the cyclically operable mechanism, such as a printing mechanism, is re-activated by means of a mechanism controlling contact actuated by erasing eccentric means.

For an understanding of the principles of the invention, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a somewhat diagrammatic illustration of the printing unit of a tube or hollow article printing apparatus incorporating the present invention;

FIG. 2 is a plan view of the printing apparatus shown in FIG. 1, with the eccentrics illustrated somewhat diagrammatically; and

FIG. 3 is a schematic wiring diagram of the control device of the present invention.

Referring to FIGS. 1 and 2, the printing unit therein illustrated comprises a carrier cylinder or drum 1 for segmental printing plates 2 and 3. Carrier 1 may be fixedly located or either the carrier or plates 2 and 3 may be movable away from the printing line, as by being swung out of the way. A turret plate 4 is operatively associated with carrier 1 and printing plates 2 and 3. Turret plate 4 carries several rotary mandrels 5 through 10, on which are mounted the workpieces to be printed. In the illustrated example, these workpieces are shown as tubes 11 mounted on the mandrels 5 through 10.

In accordance with the invention, a checking device 12 is mounted at a selected one of several stopping points in advance of the printing unit, for example, three stopping points before the printing unit or at the position of mandrel 7 as indicated in FIG. 1. Checking device 12 transmits pulses to a control device 15, shown in FIG. 3. Such pulses, in the absence of workpieces 11 on one of the mandrels 5 through 10 as detected by checking device 12, are transmitted by means of a driving eccentric 13 geared to be rotated by turret plate 4. The checking device 12 may be an electromechanical device or a photoelectric cell.

Referring to FIG. 3, control device 15 includes several control or storage relays 16, several erasing relays 17, and step switches 18 stepped by the relays. The control device serves to store the signals through the medium of the stepped switches, and the stored signals are transmitted to a mechanism controlling contact 20 actuated by an eccentric 19. By operation of controlling contact 20 by eccentric 19, disconnection of the printing or lacquering unit is initiated. For example, this may be effected by disengaging an electromagnetic clutch and engaging a brake, both in device 21. After the absence of workpieces has been corrected, the electromagnetic clutch is re-engaged and the brake released through a mechanism controlling contact 23 operated by an erasing eccentric 22. When clutch is re-engaged, carrier 1 is again rotated.

In arrangements wherein the printing segments are arranged to be pivoted or swung away from the printing line, the stored signals are transmitted through controlling contact 20, actuated by blocking eccentric 19, to an electromagnetic control valve which has not been illustrated. A printing arrangement wherein the printing segments are arranged to be pivoted or swung away from the printing line is illustrated, for example, in U.S. Patent No. 3,200,742, issued August 17, 1965, on an application filed December 27, 1962. U.S. Patent No. 3,200,742 illustrates a piston 10 displaceable in a cylinder 7 in accordance with fluid pressure admitted through lines 38 and 40. Fluid pressure is admitted through the lines 38 and 40 in accordance with suitable control means.

In actual practice, this control means may comprise an electromagnetic valve such as, for example, a valve manu-

factured by J. F. Zimmer and designated "Type 484" or "Type 485." This Zimmer valve is only one of several known types of electromagnetic valves which are commercially available and which may be purchased. In the present invention, the electromagnetic valve would be substituted for the electromagnet clutch 21.

In the schematic wiring diagram of FIG. 3, a main switch 24 is arranged to connect a supply line 25 with a feed bus or line 26. Through an intermediate switch 27 for controlling the clutch and brake device 21, line 26 is connected to auxiliary relays 28. The mechanism controlling contact 20 is located in a line 29, also leading from feed line 26 to auxiliary relays 28, and in parallel with switch 27. A line 30 connects switch 24 to control device 15.

The arrangement illustrated in the drawings operates in the following manner. As stated, checking device 12 can be arranged selectively at any one of several stepping points in advance of the printing unit. The relatively small and compact control device 15 can be housed either in the machine itself or in an existing junction box, terminal box, switch box, or the like. The number of stepping points between the printing unit and the checking device 12 depends on the storage capacity of the step switches 18 in the control device 15.

When an empty mandrel 5 through 10 passes checking device 12, the latter detects the absence of a workpiece and transmits a signal to control device 15. Device 15 stores this signal, or stores a sequence of signals, until the empty mandrel arrives at the printing unit. When the empty mandrel is at the printing unit, the stored signals cause control device 15 to set up a circuit for transmission of signals as a result of operation of blocking eccentric 19 operated by printing unit 1. As soon as the next signal from controlling contact 20, operated by blocking eccentric 19, is delivered, the device which deactivates the printing unit is rendered active. The printing unit remains deactivated as long as workpieces are missing from successive mandrels 5 through 10.

However, if checking device 12 does not transmit any further signals to control device 15, meaning that other mandrels have workpieces 11 thereon, the printing unit is again activated, or brought into the printing position, by means of a controlling contact 23 operated by an erasing eccentric 22 driven by turret plate 4.

The described arrangement is simple and permits a very precise operation. Thus, it provides for the printing segments operating with a true position with respect to turret plate 4 when tubes 11, or other hollow workpieces to be printed, are mounted on mandrels 5 through 10. However, the printing unit still remains free for manipulation. The step switches 18 are actuated only when signals are stored, thereby increasing the life of the step switches.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A control device for cyclically operating apparatus to

interrupt the operation thereof in the absence of workpieces to be processed, and including a cyclically rotatable turret plate having uniformly circumferentially spaced mandrels carrying hollow workpieces through plural stopping points and eventually into operative relation with a work unit included in said apparatus, said device comprising, in combination a checking device selectively positionable fixedly at a selected one of said stopping points in advance of said work unit adjacent the path of movement of said mandrels and operable to detect the absence of a hollow workpiece on a mandrel; a control device for storing and releasing signals; a first control switch connected in a first input circuit to said control device; a first driving eccentric periodically closing said first control switch in accordance with rotation of said turret plate, said first control switch, in conjunction with said checking device, transmitting pulses through said input circuit to said control device for storage of signals responsive to absence of a workpiece on a mandrel; a second control switch; a coupling and braking device effective, when activated, selectively to drive said work unit or to arrest the latter at a fixed position; a controller for said device; said second control switch being a normally open switch connected in an input circuit to said controller; a second eccentric operable by said work unit and effective to close said second control switch to transmit a signal to said controller for activating said device to interrupt the operation of said work unit; a third control switch connected in a second input circuit to said control device; a third eccentric operated cyclically by said rotating turret plate to close said third control switch to complete said second input circuit to deliver an erase impulse to said control device; circuit means connecting said control device to said controller and operable, responsive to a receipt of an erasing pulse from said second input circuit, and in the absence of a pulse from said first input circuit provided by activation of said checking device responsive to absence of a hollow workpiece on a mandrel, to condition said controller to operate said coupling and brake device to restart cyclical operation of said apparatus.

2. A control device, as claimed in claim 1, in which said checking device comprises an electro-mechanical device.

3. A control device, as claimed in claim 1, in which said checking device comprises a photocell.

4. A control device, as claimed in claim 1, in which said control device comprises a control relay connected to said first switch, an erasing relay connected to said third switch, and stepping switch means operated by said control relay and said erasing relay.

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